

WISSENSCHAFTLICHE KURZMITTEILUNG

*Marmosops scapulatus* Burmeister, 1856, and the brown mutation in didelphids (Marsupialia)

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A female mouse opossum of the genus *Marmosops* Matschie, 1916, showing an unusually pale coat color was collected in the Atlantic Coastal Forest in Brazil in July of 1992 (see figure). The site is the Intervales biological reserve in the State of São Paulo, 24° 20' S, 48° 25' W. The animal was captured in a Sherman trap tied to a tree limb at approximately 1.5 m from the ground in primary forest habitat. It was immediately recognized for its unusual coloration since the only species of *Marmosops* known to occur in all southeastern Brazil, *M. incanus*, shows an invariably dark gray-brown coloration above and creamy white below (EMMONS 1990). The pale female is light cinnamon-brown dorsally, corresponding to a score of 7.5 YR 4/4 in the Munsell system of color (MUNSELL COLOR COMPANY 1976). The underparts are of a pinkish, creamy white. The dorsal coloration of *M. incanus* (as measured from the other individuals collected in Intervales) corresponds to a score of 10 YR 2/1. The pale individual was prepared as skin, skull, and partial skeleton and will be deposited at the Museu de Zoologia da Universidade de São Paulo. A sample of liver tissue was preserved in ethanol for molecular analyses. Female mouse opossums are generally much smaller than males, but old females may reach the size of males (TATE 1933). The pale female was a very old individual (age class 7 of TRIBE 1990), and equalled in size the adult males of *M. incanus* collected at that locality.

Not surprisingly, new species of mammals are still being described in South America (e.g. the marmoset, *Callithrix maues*, of the Amazon basin by MITTERMEIER et al. 1992; the lion tamarin, *Leontopithecus caissara*, of the Atlantic Forest by LORINI and PERSSON 1990; three new species of gracile mouse opossums, genus *Gracilianus*, from the forested Andean slopes by HERSHKOVITZ 1992). To evaluate the possibility that the pale female represented a new species of *Marmosops*, I sequenced the first 380 base pairs of the mitochondrial cytochrome b gene for 4 of the individuals collected at that locality. I also looked for differences in cranial characters. No significant differences were found among the several skulls, apart from size-related ones. The comparison of the cyt. b sequences revealed the presence of two haplotypes, differing by only one silent, third position transition. The pale female and an individual of normal coloration had one haplotype, with the other 2 individuals showing the other. Sequence variation (calculated as the number of varying sites divided by the total number of sites compared), therefore, amounts to 0.3 percent, well within the range of intrapopulation variation for this gene observed in other species (SMITH and PATTON 1991).

DNA sequencing was a quick way to test the hypothesis that the pale female represented a different, so far undescribed, species of *Marmosops*. Since it is not a new species, its unusual coat color might be an age-related phenomenon, or might represent a rare mutation. The first alternative seems unlikely since no other individual with the same

contrasting coloration has ever been collected in that area, despite recent extensive collecting efforts (DE VIVO, pers. comm.).

HARTMAN (1921, 1922) reported on a brown or cinnamon variety of the Virginia opossum (*Didelphis virginiana*). In those individuals, the underfur was of a "uniform and delicate light brown" instead of black. HARTMAN (1921, 1922) associated this color morph with the so-called brown mutation in house mice. Currently, this recessive allele is known to occur in several orders of mammals (SEARLE 1968). The predominant effect of the *b* allele is to change the nature of eumelanin from a black to a brown pigment, and thus the coat color from gray to cinnamon brown (SILVERS 1979). As expected in a brown individual, the pigment granules in the pale *M. incanus* female are of a brownish color, instead of the black color displayed by the typically colored *M. incanus* individuals.

In a recent study, DE OLIVEIRA et al. (1992) reported on the results of their analysis of pelage variation in this same species. The authors concluded that the different pelage types of *M. incanus* represent different ontogenetic and sexually dimorphic states, and not seasonal (summer and winter) pelage types as it was previously believed (e.g. EMMONS 1990). The authors agree with EMMONS (1990) in synonymizing *M. scapulatus* Burmeister, 1856, to *M. incanus*, believing that it had been described as a different species on the basis of the misinterpreted pelage variation.

Besides the pelage type, however, the *M. scapulatus* male individual is also distinct from other *M. incanus* individuals by its general coloration, originally described by BURMEISTER as being composed of hairs "at base slate gray, then pale yellow-red, and last cinnamon" (TATE 1933). It seems reasonable to argue that the *M. scapulatus* individual and the pale female described here represent two independent manifestations of the same rare, recessive allele, separated in time by at least 136 years.

Interestingly enough, a female *Philander* of a similar, pale coloration was recently collected in the Atlantic Forest by P. HERSHKOVITZ. The female *Philander* later gave birth to several young of normal, dark coloration. Pending on a closer study of this specimen, it raises to three the didelphid genera known to present the brown mutation, making it more common and widespread in didelphid marsupials than presently known.

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*Marmosops incanus* Lund, 1840, collected in Intermittentes, Brazil: an adult male (left) and the brown female (right)

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